diseased bark or both in the movements of the birds over these surfaces. This conclusion is supported by the fact that the birds tested were not carrying ascospores; that we have no evidence that ascospores are washed down the trees during the winter and spring months;[11] also that following a rain period pycnospores are to be found in abundance on the healthy bark below blight lesions.

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The Relation between Abnormal Permeability and Abnormal Development of Fundulus Eggs

In a previous paper[1] the suggestion was made that certain abnormalities in *Fundulus* embryos are caused by increase in permeability since osmotic pressure is not the cause and so many *different* substances have the *same* effect. It was found that the normal egg in distilled water or a "balanced" salt solution is impermeable to salts (Appendix II.). The egg appeared to be impermeable to water also, since enormous osmotic changes have no effect on it. The egg was found to contain nearly three times as much ash as sea water. The greater part of the ash is insoluble, but some of it may have been rendered so by the ashing. However, the soluble ash (3.18 per cent.) is as great as the total salts (2.84–3.29 per cent.) in the local sea water. And yet the egg develops normally, with little or no change in volume, in distilled water or in sea water that is evaporatd to one half its volume, suggesting impermeability to water. The fact that the eggs dry up when exposed to air may be taken to indicate an increase in permeability to water, due to drying of the superficial layer or plasma membrane.

[11] Heald, F. D., and Gardner, M. W., "Preliminary Note on the Relative Prevalence of Pycnospores and Ascospores of the Chestnut Blight Fungus during the Winter," Science, N. S., 37: 916–917, 1913.

[1] McClendon, *Am. Jour. Physiol.*, 1912, XXIX., p. 290.

In the same paper some preliminary chemical studies of the permeability were described, and the view advanced that the egg is normally impermeable to Mg ions, but since Mg was found to diffuse out of the eggs in a pure NaCl solution, this solution may have increased the permeability to Mg (p. 296). Only one experiment to test the permeability to anions was described. $MgSO_4$ solution was used, with negative results. However, the $MgSO_4$ contained too large a trace of chloride to make it possible to detect a very small diffusion of chloride from the eggs.

During the present season I was able to obtain especially pure salts, and have observed diffusion of both anions and kations from the eggs in pure solutions of these. The monstrosities produced in unbalanced salt solutions have also been studied. The experiments support the following generalizations:

1. Any solution of one or more of the salts of sea water, which is sufficiently unbalanced by other salts, *i. e.*, has a certain excess of some one kation, produces a number of types of monstrosities in *Fundulus* eggs. The types of monsters produced by the excess of one kation (*e. g.*, Na) are the same as those produced by any other (*e. g.*, K, Ca or Mg). Thus a qualitatively *specific action of a salt or ion does not exist.*

2. *These unbalanced salt solutions cause an increase in the permeability of the egg to salts.* This conclusion is based on the following data: The eggs in distilled water or in van't Hoff's solution (made with nitrates) lose no salts or ions that can be detected, except the ions of carbonic acid. On the contrary, the eggs give out salts or their ions in a mixture of NaCl and KCl or in pure solutions of the following salts: NaCl or nitrates of Na, K, Ca or Mg *in concentrations that do not kill the eggs* during the experiment. If the eggs are killed a more rapid diffusion takes place. The methods used will be published elsewhere.

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